

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

BEAVERHEAD - BITTERROOT FOREST INSECT

CONTROL PROJECT

Recommendations in Connection with
the 1927 Operation

Forest Insect Field Station,
Coeur d'Alene, Idaho,
November 24, 1926.

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INTRODUCTION

The intent of this report is to make to the District Forester such recommendations as are necessary for the continuation of the Beaverhead - Bitterroot Forest Insect Control Project during the season of 1927. These recommendations cover such details as the allotment of funds, plans of control, details of operations, etc., and are based upon data secured during the past summer's survey. The writer is preparing a paper covering some of the minor details of control project administration, which will include a report of the past control work.

During August and September an extensive examination was made of the East Fork drainage of the Bitterroot River and the west side of the Big Hole Basin. The time available was far too limited for even an examination of this character. Forty-five days were actually spent in the field and approximately 423 sections or 27,000 acres were covered or for each day in the field 6,000 acres or 9 sections were surveyed. This information is given in order that the readers of this report may appreciate the fact that

when the data from intensive surveys made in connection with the control work are available many discrepancies may appear in the figures as here given.

SURVEY METHODS USED

In order to cover the area in the limited time available it was necessary to plan the work on a very extensive scale. To secure as much data as possible upon which estimates of the 1926 infestation could be based the following methods of survey were adopted. Sample strips one chain wide were run through the areas where it was believed control measures would be necessary on which the 1926 attacked trees were counted. These strips were located as fairly as possible and in many instances were run on definite compass bearings. In most cases the number of infested trees was recorded for every ten chains, though in some few instances longer distances were used. Horseback trips were taken around and through areas where it was impractical to establish sample strips. Many drainages were viewed from vantage points and red top trees counted.

In July, Mr. Howard Flint, Forest Inspector from the Missoula Office, made an airplane flight over the project area. The data secured, though rather conservative, was found to be very accurate. A copy of Mr. Flint's memorandum is attached to this report.

STATUS OF THE 1926 INFESTATION

In presenting the status of the 1926 infestation the infested region within each forest has been divided into control units and these in turn into control areas. Rough boundaries are given for each control unit and its areas which will no doubt require some adjustment when more definite data is secured. In addition to the topographical features the question of transportation was a determining factor in the establishment of these boundaries. An attempt was made to locate them so that the serving of camps by pack trains would be reduced as much as possible. The control areas within the different units were determined by their topographical features and the feasibility of transportation from the headquarter camp of each unit. Though brief descriptions have been given of these control unit and area boundaries, the attention of the reader is directed to the map accompanying this report.

Beaverhead National Forest

During the past season's control operation it seemed rather evident to the writer that the infestation within the Big Hole Basin was a local condition only and not related to the Bitterroot epidemic. This belief was based upon the fact that a possible source of infestation for every group of 1925 attacked trees could be traced back at least two years through the 1924 and 1923 infestation. It was further believed that some three or four years ago this infesta-

tion was started by an influx of beetles from some distant region and the intervening time spent in building up the condition as it existed last season. It is further possible that this introduction occurred at the same time as the inception of the Bitterroot epidemic. This theory is, of course, but the belief of the writer and may or may not be true, but it is assured that at this time there can be but little question as to the relationship between the two outbreaks. The results of the survey showed that during the summer the areas which had been thoroughly cleaned by control work in 1926 had been reinfested to an extent at least equal to the volume treated. The source of this reinfestation is difficult to account for except by the spread of the beetles across the Continental Divide. Furthermore, in support of this solution a fairly heavy infestation was found in the timber stands within the Mussigbrod Pass upon the Continental Divide.

In addition to this information it was found that the territory which will need to be covered by control work in 1927 is a great deal larger than had been assumed. It will now be necessary to cover practically the entire east side of the Basin from Moose Creek to Pintlar Lake. The following is a rough description of the different control units and the areas within them including the status of infestation for each. It will be noted that in the data as given for the control areas, the number of 1926 trees is practically an estimate on the part of the writer. This estimate, of course, has been based

upon the data secured from the sample strips and a personal knowledge of conditions within the area.

CONTROL UNIT #1. (Swamp Creek Unit).

Boundary of Unit - From Trail Creek south to limits of infestation which is known to exist on Moose Creek.

Amount of sample strip in Unit.

Moose Creek - 4 1/2 miles	36 A
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Swamp Creek - 7 miles	56 A
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Number of 1926 attacked trees counted

Moose Creek	36
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Swamp Creek	27
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Number of 1926 attacked trees per acre of strip

Moose Creek	1.0
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Swamp Creek	<u>.5</u>
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Average	1.1
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Funds required	\$2,000.00
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Remarks: But very little data are available for this unit, aside from the fact that there are scattered infested trees throughout the entire region. This region will need to be covered rather thoroughly by an extensive strip survey in order to locate those areas which will require intensive spotting and control work.

CONTROL UNIT #2. (Battlefield Unit).

Boundary of Unit - North from Battlefield to Johnson Creek, and

west from the Forest Boundary to the depth of the infestation.

Control Area "A"

Location of Camp - Battlefield Ranger Station.

Boundary of Camp Area - North to Tie Creek including the region adjacent to and west of the Battlefield.

Amount of sample strip in Area - $4 \frac{1}{8}$ miles	33 A
Total number of 1926 attacked trees	135
Number of 1926 attacked trees per acre of strip	4
Estimated lodgepole acreage	1000
Estimated number of 1926 attacked trees	1000
Funds required	\$1,870.00

Remarks: A few trees were treated in this area last season.

Control Area "B"

Location of camp - _____

Boundary of Camp Area - North from Area "A" to and including lower part of the Johnson Creek and west from Forest Boundary to include the rather low pass between Johnson and Tie Creeks above Maybee Meadows.

Amount of sample strip in Area - $8 \frac{3}{8}$ miles	67
Total number of 1926 attacked trees	77
Number of 1926 attacked trees per acre of strip	1.1
Estimated lodgepole pine acreage	2560
Estimated number of 1926 attacked trees	1200

Funds required

\$2,250.00

Remarks: It is not expected that any infestation will be found north and west of Maybee Meadows. Spotter's camps should be located in this area sufficiently ahead of the control crews so that the camp sites can be properly located. It will no doubt be necessary to move camp at least once within this area.

Control Area "C"

Location of Camp - _____

Boundary of Area - Johnson Creek drainage north and west of area "B" depending upon the extent of the infestation located by spotters.

Estimated number of 1926 infested trees

350

Funds required

\$650.00

Remarks: No definite data for this area are available, aside from that secured by riding across the drainage from Maybee Meadows, and up the Johnson Creek Trail. Scattered individuals and small groups of infested trees were recorded as far as the 3 mile post. As with area "B" this area should be spotted ahead of the control work so that the camp site, or sites if necessary, can be properly located.

CONTROL UNIT #3. (Saw Mill Unit).

Boundary of Unit - Bender Creek drainage on the west to Howell Creek on the northeast, and from the Forest Boundary north to the depth of the infestation.

Remarks: Though the greater part of this Unit was thoroughly covered by control measure last season it is here that the heaviest infestation exists. It is in this region that the heavy reinfestation from the Bitterroot is apparently occurring. It is for that reason that the unit has been made an extremely large one, with the idea that the centralization of the work would be in this region.

Control Area "A"

Location of Camp - _____

Boundary of Area - Bender Creek drainage as far north as infestation extends, and east to the divide between Bender Creek and Mussigbrod Creeks. South and west to northern boundary of Control Unit #1.

Estimated number of 1926 attacked trees -	500
Funds required	\$930.00

Remarks: No definite data for this area are available, but from the condition of infestation observed it is estimated that there will be as many trees as were treated last year.

Control Area "B"

Location of Camp - Wharton (Combs) Sawmill, foot and head of Mussigbrod Lake and Mussigbrod Pass.

Boundary of Area - Mussigbrod Drainage from the forest boundary to the Continental Divide. West to Area A and east to the Mussigbrod-

Plimpton Divide.

Amount of Sample Strip in Area 15 2/8	122 A
Total number of 1926 attacked trees counted	291
Number of 1926 attacked trees per acre of strip	2.4
Estimated lodgepole pine acreage	5,000
Estimated number of 1926 attacked trees	4,500
Funds required	\$8,450.00

Remarks: At the head of Mussigbrod Creek there is a low pass which is heavily timbered on both sides of the Continental Divide. There is a severe infestation at the head of Mussigbrod and in this pass, which should be treated.

Control Area "C"

Location of Camp - Johnson Saw Mill, Plimpton Ridge and north in Plimpton Creek if necessary.

Boundary of Area - Plimpton Creek drainage and the region known as Plimpton Ridge, which lies between the Clam and Thompson Creek drainages and Plimpton Creek.

Amount of sample strip in Area 13 1/2 miles	108 A
Total number of 1926 attacked trees counted	178
Number of 1926 attacked trees per acre of strip	1.6
Estimated lodgepole pine acreage	2,500
Estimated number of 1926 attacked trees	2,500
Funds required	\$4,600.00

Control Area "D"

Location of Camp - Clam Valley, old saw mill on Fork of Thompson Creek and on Howell Creek if necessary.

Boundary of Area - Clam, Thompson, and Howell Creek drainages.

Amount of sample strip in area - 5 1/2 miles	44 A
Total number of 1926 attacked trees counted	256
Number of 1926 attacked trees per acre of strip	5.8
Estimated lodgepole pine acreage	2,500
Estimated number of 1926 attacked trees	5,000
Funds required	\$9,300.00

CONTROL UNIT #4. (Pintlar Lake Unit).

Boundary of Unit - Northeast from the Howell-McCormick Divide to the Mudd-Fishtrap Divide.

Remarks: If funds are available the infested trees within this region should be treated, however it could be eliminated if necessary.

Control Area "A"

Location of Camps - Below and above Pintlar Lake.

Boundary of Area - From the Howell-McCormick Divide to the Pintlar-Mudd Divide.

Amount of sample strip in area - 26 6/8 miles	214 A
Total number of 1926 attacked trees counted	558
Number of 1926 attacked trees per acre of strip	2.6
Estimated lodgepole acreage	8,000

Estimated number of 1926 attacked trees	6,000
Funds required	\$11,000.00

Control Area "B"

Location of Camp - Sec. 4 - 2 N. 14 W.

Boundary of Area - East from Pintlar-Mudd Divide to Mudd-Fishtrap Divide.

Amount of Sample strip in area - 36 miles	288 A
Total number of 1926 attacked trees counted	186
Number of 1926 attacked trees per acre of strip	.6
Estimated lodgepole acreage	2,500 A
Estimated number 1926 attacked trees	1,000
Funds required	\$1,870.00

Bitterroot National Forest

The territory within this forest which will be covered by control work is so small that the adoption of more than one control unit is unnecessary as practically the entire project will be serviced from the Jennings Ranger Station. In the continuation of the plan of defense adopted in 1926 it will be necessary to rework practically the same region as covered by last season's control operation. This one control unit has been divided into five control areas which were determined by their topographical features and available camp sites.

During the past season the beetles swept from the regions of untreated trees into the areas covered by control work in tremendous

numbers. This reinfestation will prove to be a great deal heavier than that which existed last year. The following is a brief description of the different control areas and the status of infestation within them. As in the Beaverhead the number of 1926 attacked trees as given for each area is but an estimate on the part of the writer. Though this estimate has been based upon the data secured from sample strips and a personal knowledge of the area it is believed that in most cases it is too conservative.

CONTROL UNIT #5. (Jennings Camp Unit).

Boundary of Control Unit - Tolan, Mink, and Springer Creek drainages.

Control Area "A"

Location of Camps - _____

Boundary of Area - Tolan Creek drainage south of 4 B Cabin.

Funds required \$2,000.00

Remarks: Very little data are available for this area aside from the knowledge that there are scattered infested trees throughout it, but no sample strips were established.

Control Area "B"

Location of Camp - 4 B Cabin.

Boundary of Area - North from camp one mile to Springer-Mink Creek Divide. South 1 1/2 mile including the 4 B Cabin Fork of Tolan Creek. Down east slope of Meadow Creek 1/4 mile.

BEAVERHEAD - BITTERROOT FOREST INSECT
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Amount of sample strip in area - 8 3/4 miles	70 A
Total number of 1926 attacked trees counted	198
Number of 1926 attacked trees per acre of strip	2.8
Estimated lodgepole pine acreage	600
Estimated number of 1926 attacked trees in area	2,000
Funds required	\$3,750.00

Control Area "C"

Location of Camp - Head of Springer Creek

Boundary of Area - Springer Creek drainage including the Mink-Springer Divide. North along Meadow Creek ridge 1/2 mile, south to area "A"

Amount of sample strip in area - 7 1/2 miles	60 A
Total number of 1926 attacked trees counted	287
Number of 1926 attacked trees per acres of strip	4.8
Estimated lodgepole pine acreage	600 A
Estimated number of 1926 attacked trees in area	3,000
Funds required	\$5,600.00

Control Area "D"

Location of Camp - Sage Brush Hill.

Boundary of Area - From Jennings' Camp Creek trail south along ridge to Area "B". Area extends north to river and over Meadow Creek ridge as far as possible.

Amount of sample strip in area - 5 7/8 miles	47 A
Total number of 1926 attacked trees counted	937

Number of 1926 attacked trees per acre of strip	20
Estimated lodgepole pine acreage	400 A
Estimated number of 1926 attacked trees	6,000
Funds required	\$11,200.00

Control Area "E"

Location of Camp - Sage Brush Hill.

Boundary of Area - Ridge between Meadow Creek and River, extending from ridge to the river.

Amount of sample strip in Area - 2 3/4 miles	22 A
Total number of 1926 attacked trees counted	1,366
Number of 1926 attacked trees per acre of strip	62
Estimated lodgepole pine acreage	222 A
Estimated number of 1926 attacked trees	12,000
Funds required	\$22,800.00

METHODS OF CONTROL

Inasmuch as the entire infested length of each tree must be treated it is recommended that the burning method of control be used whenever possible. It is believed that the method of burning, which was developed in the Big Hole Basin last season, offers a cheaper treatment than that of peeling. In this method the trees are peeled, cut into 14 to 16 foot logs, skidded into decks with a single horse, and burned. On the Beaverhead National Forest this method can be used throughout the entire project, but on the Bitter-

root there may be some slopes which are so steep that it would be impractical. However, it should be used whenever possible.

Furthermore, it is recommended that no attention be paid to the brush and accompanying debris resulting from the control operation. Though it is fully realized that this recommendation is not in accordance with the policies of the forests upon which this project falls, it is believed that the cost of treating the infested trees will be raised from 30 to 35 percent by the piling and burning of the brush. This project presents an emergency situation which will require careful expenditure of every dollar available in order that a maximum number of insects can be destroyed if it is ever hoped to check the epidemic. In brief, if the policy of slash disposal which was followed last year is continued it is doubted if funds will be available for the institution of any control work whatever within the Bitterroot National Forest.

The cost of control has been set at \$1.87 per tree, which does not include brush disposal. If the policy of piling and burning the brush which was followed last year is continued, then a cost of \$2.50 per tree must be assumed to care for the increased labor. These figures are based upon the 1926 operation, and it is hoped that it will be possible to establish a lower cost during the 1927 operation.

PLAN OF CONTROL

At a conference of Forest Service and Bureau of Entomology

officers held in Missoula on July 27, 1925, it was decided that the control measures instituted against the insect epidemic in the East Fork drainage of the Bitterroot National Forest should be directed towards the following results as their objectives. These objectives are given in the order of their importance.

First: The protection of the merchantable timber stands within the Beaverhead National Forest (Big Hole Basin) by preventing the start of an epidemic in that region.

Second: The protection of the yellow pine stands of the West Fork drainage of the Bitterroot River by preventing the westerly spread of the infestation into that region.

Third: Checking the northern spread of the infestation into the Weeping Child and Stalkoho drainages.

The plan of control as adopted for the 1926 season had as its foundation the accomplishment of objective #1 and #2 with primary stress being laid upon objective #1. Objective #3 was eliminated from all thoughts of control due to the unfavorable entomological features of the problem and the shortage of funds available for control work. It is felt that there can be no other alternative aside from the continuation of this plan, the details of which will be discussed separately for each forest.

Beaverhead National Forest

In following the plan of control as adopted in 1925, which

has as its primary objective the protection of the timber within the Big Hole Basin, a question as to the manner of directing the offensive within this region arises. The proper execution of this plan would call for the treatment of all the infested trees within the Basin each year as long as an epidemic condition existed. With a yearly infestation of such a magnitude that the available funds will permit of following this plan, there exists no issue. However, with the occurrence of infested trees in such numbers that available funds would not permit of their treatment, the question as to which portion of the region should be left untreated becomes an issue. In the northeast of this area there is a fine body of mature lodgepole pine which is not only merchantable at this time but is included in the Mudd-Pintlar Creek Timber Sale. Within this body of pine there is a rather heavy infestation which if not checked will reduce if not exterminate the merchantable volume. However, when this has been accomplished there is little further damage that could result as this region joins the huge smelter killed area on the north. On the other hand if the lighter and somewhat scattered infestation adjacent to and south of the Battlefield is allowed to develop the entire lodgepole pine stands of the Beaverhead as well as those which extend further south are seriously menaced.

In considering this situation it is believed that an offensive should be planned having as its objective the prevention of the southern spread of this outbreak as well as the protection of the timber stands within the Big Hole Basin. This objective could best be accom-

plished by the treating of the infested trees within control units #1, #2 and #3, and if funds will permit #4. In this connection the drawing of the line of demarkation between the normal condition and the small groups of scattered trees comprising the advanced element of the infestation which exists within control unit #1 presents a difficult problem to solve. Before instituting control measures within this region it will be necessary to make a rather thorough extensive survey in order that the spotting can be more efficiently directed.

Bitterroot National Forest

It will be remembered that the plan of control adopted had as its second objective the protection of the yellow pine stands within the West Fork drainage of the Bitterroot. To accomplish this result by preventing the spread of the infestation into that region, a defensive zone covering the Tolan, Mink and Springer Creek drainages was established at the head of the East Fork epidemic. This plan called for the treating of all infested trees within this zone of defense each year until such a time as the epidemic or source of infestation had ceased to exist. With the main body of the epidemic advancing there is no doubt but that the infestation within this zone will increase each year until its peak has been passed. This means that there will be two or more years of extremely heavy infestation to be treated and the strength of the plan depends upon the holding

of the zone over this period. In accordance with this plan of control a large percent of the trees within this zone were treated in 1926. In its continuation which the writer feels is the only feasible plan of attack within this region the infested trees within control areas A, B, C and D must be treated during the coming season. Furthermore, the offensive should be pushed across and down the Meadow Creek slope as far as funds will permit. Due to the severe infestation which exists within area "E" it is doubted if funds will be available for its treatment. However, it is a serious source of reinfestation so should be covered if at all possible.

PLAN OF OPERATION

Supervision

Due to the extremely large territory which this project covers, especially within the Big Hole Basin, the marking of the infested trees for treatment will be one of the most important phases of the work during the coming season. In this phase of the work, men who have a working knowledge of a compass, who can pace accurately and map the areas cruised, will be required to take charge of the spotting crews. Furthermore, it will be necessary to send these men into areas ahead of the control crews for the purpose of securing more accurate data relative to the status of infestation as well as the marking of infested trees for treatment. So in addition to the qualifications required

for a chief of spotting crew, men of responsibility who have more than a mercenary interest in the work, must be secured, as many phases of the project will rest upon their information and decisions. These men should be carefully selected as in reality they will become assistants to the officer in charge of the project. It is believed that at least six men of this character will be required for the successful execution of the work within the Big Hole Basin and four within the Bitterroot drainage. At least ten days prior to the starting of control work these men should be assembled in one centrally located camp in order that instruction can be given them in the various phases of the work.

Spotting

Inasmuch as there are no trees within this project which have been actually marked for treatment it will be necessary to start the survey work on a rather large scale ten days prior to the arrival of the control crews. To effectively carry on this work the men acting as spotters must receive a somewhat careful training. They should be carefully selected, as the duties of a spotter are exacting and rather severe, and assembled ahead of the control crews in time to start the spotting as planned. Ten of these men will be required for the carrying on of the work within the Beaverhead National Forest and six within the Bitterroot. Details of the methods of survey, mapping, and marking of trees will be furnished at a later date.

Details of Operation

A somewhat detailed plan of operation has been prepared by the writer as a basis upon which to start the operation. Though it is fully realized that corrections and additions will no doubt be necessary it is believed that if this plan is followed it will result in the starting of the project in a satisfactory manner. This plan is to show the need for the careful planning of the small details in order to prevent the lost motion which so often occurs at the beginning of these projects. The writer wishes to stress the importance of not being in too great a hurry to start the actual control work. This work can be more efficiently directed with a correspondingly reduced cost per treated tree if the spotters are far ahead of the control crews.

Though a great deal of duplication occurs this plan is given for both the Beaverhead and the Bitterroot National Forests.

Beaverhead National Forest (Big Hole Basin).

Due to the size of the area to be covered it is believed that it will be necessary to actually carry on control work within Control Units #2 and #3 and no doubt #1 at the same time. Though this will mean a decentralization of force and will result in more difficult supervision, the difficulty and expense of the frequent moving and directing of the large camps which would be necessary if an attempt was made to work straight through the area would more than offset

these objections.

I. Two weeks prior to the arrival of the control crews the six men who have been selected as assistants to the officers in charge of the project, as chiefs of spotting crews, camp foreman, etc., should be assembled and located at a camp previously established at the Wharton Sawmill on Mussigbrod Creek, in Control Unit #3.

A. Field instructions could then be given these men by the Forest Entomologist and Forest Officer in general charge of the project as follows:

1. Methods of survey.
2. Location and marking of infested trees.
3. Methods of treatment.
4. Keeping of records.
5. Life history and habits of the mountain pine beetle.

II. Three days after the arrival of these assistants the men who have been selected to act as spotters should be assembled at the same camp. At that time they could be assigned to crews and after a brief course of instruction the spotting of the Wharton Sawmill areas could be started.

A. The best results, especially at first while the men are being trained, will be secured from a three man crew. The chief or compassman and two spotters each covering a strip one chain wide on each side of the compassman. This survey should be made by sections and the infested

trees mapped upon Forest Service forms 878.

III. Prior to the arrival of the control crews at the Wharton Sawmill camp, spotter's camps should be established as follows:

- A. In completing the work in Control Unit #3, spotting should be started in the Bender Creek and Mussigbrod Creek areas.
- B. At the Battlefield in order to take charge of the spotting within Control Units #2.
- C. An extensive survey followed by intensive spotting, if necessary, within Control Unit #1.
- D. If funds are available the project should close on Control Unit #4. By leaving this unit until the last the question of having sufficient funds to treat the infested trees upon the other and more important units would be settled.

IV. Ten days after the starting of the spotting within the Wharton Sawmill area at least one control crew should be established. The need for more than one crew can best be determined after the first few days of spotting.

- A. It was found that where the brush is to be piled and burned a crew of seven men gave the best results. However, it is believed that if the brush is left, the same volume of work could be produced with only five men.

V. As soon as the spotting within the different areas has pro-

gressed sufficiently far to enable the efficient directing of control work treating crews should be send into these areas.

- A. The number of these crews required is difficult to determine and will depend entirely upon the severity of the infestation within the areas of the different units. After the project has been under way for some two or three weeks, if it is found that the spotting is progressing faster than the actual control work, then additional control crews can be added.

VI. As the work is completed within each area of the different control units the spotters and control crews will move into the remaining areas until that unit is completed.

Bitterroot National Forest.

- I. Two weeks prior to the arrival of the control crews the four men who have been selected as assistants to the officer in charge of the project as chiefs of spotting crews, camp foreman, etc., should be assembled and located at a camp previously established on the head of the Springer Creek drainage.

- A. Field instructions could then be given these men by the Forest Entomologist and Forest Officer in general charge of the project as follows:

1. Methods of survey.
2. Location and marking of infested trees.

3. Methods of treatment.
4. Keeping of records.
5. Life history and habits of the mountain pine beetle.

II. Three days after the arrival of these assistants, the men who have been selected to act as spotters should be assembled at the same camp. At that time they could be assigned to crews and after a brief course of instruction the spotting of Control Area "C" could be started.

- A. The best results especially at first while the men are being trained will be secured from a three man crew. The chief or compassman and two spotters each covering a strip one chain wide on each side of the compassman. Inasmuch as this territory is unsurveyed it will be necessary to utilize trails, streams, and ridges for base lines from which the cruise can be made. Infested trees should be mapped upon Forest Service Forms 878.

III. Prior to the arrival of the control crews at the Springer Creek Camp spotter's camps should be established as follows leaving one crew in this area to complete the spotting if necessary.

- A. Two spotting crews should be located at the 4 B Cabin in order that at least one week's spotting can be accomplished before the institution of control work within Control Area "B". This advanced spotting is

essential for the determining of the size of the treating crews required and the proper directing of the work.

B. One spotting crew should be located in a camp in Control Area "A". This area is an extremely large one and the infested trees are badly scattered, so a tremendous amount of work will be required before sufficient data can be secured which will enable the formulation of a comprehensive plan of action. From two to three weeks will be required before these data can be secured.

C. Though it will be best to establish a spotting crew within area "D" a day or two prior to the institution of control work, the infestation is of such a character that the spotting could be started at the same time as the control operation.

D. If funds are available for the institution of control work within Control Area "E" very little spotting will be required as the infestation is of such a character that it will permit of almost continuous work throughout the region.

IV. Ten days after the starting of the spotting within Control Area "C" (Springer Creek drainage) a small control crew

should be established. The size of this crew can best be determined after the first few days of spotting.

A. In using the burning method developed in the Big Hole Basin last season, it was found that where the brush is to be piled and burned, a crew of seven men give the best results. However, if the brush is left the same volume of work could be produced with only five men.

V. As soon as the spotting within Control Areas "A" and "B" has progressed sufficiently to enable the efficient directing of control work, treating crews should be established within these areas.

A. The number of treating crews required is difficult to determine and will depend entirely upon the severity of the infestation within the different areas. After the project has been under way for some two or three weeks additional crews can be added if required.

B. If funds are available for the institution of work within Control Area "E" a rather large crew could be efficiently directed from the Sage Brush Hill Camp.

VI. As the work is completed within each area, the spotters and control crews can move into the remaining untreated areas if necessary.

RECOMMENDATIONS

In the continuation of the Beaverhead - Bitterroot Forest Insect Control Project during the season of 1927 the following recommendations are made.

- I. That the plan of control as adopted in 1925 which has as its first objective the protection of the timber stands within the Beaverhead Forest, and secondly the prevention of the spread of the East Fork infestation into the West Fork drainage of the Bitterroot, be continued. (Page 15).
 - A. That in the protection of the timber stands within the Beaverhead Forest primary stress be placed upon the prevention of the southern spread of the infestation. (Page 16).
 - B. That in the checking of the spread of the East Fork infestation the zone of defense plan of control be continued as the only possible method of accomplishing this result (Page 18)
- II. That an allotment of \$53,000.00 be made for the continuance of this project during the season of 1927.
 - A. \$30,000.00 for the Beaverhead National Forest.
 - B. \$23,000.00 for the Bitterroot National Forest.
- III. That due to the amount of money involved no control measures be planned at this time for the following areas.
 - A. Control Unit #4, Beaverhead National Forest. (Page 10).

B. Control Area "E", Bitterroot National Forest (Page 14).

- IV. That in connection with the operation, the resulting slash be not piled but left as it falls from the control work. If it is ruled that the brush must be piled and burned, an additional $33 \frac{1}{3} \%$ must be added to the estimate of funds required, or a reduction made in the areas treated.
- V. That ten forest officers from different forests within the district be detailed to this project for:
- A. To act as assistants to the forest officers in charge of the work within the different forests.
 - 1. Six of these officers to be detailed to the Beaverhead and four to the Bitterroot.
 - B. For the purpose of securing training and experience in forest insect control.
- VI. That the plan as outlined, or one similar, under the caption "details of operation" be followed. (Page 21).
- VII. That the forest officers detailed to the project as assistants be assembled on the Beaverhead at least one week prior to those on the Bitterroot. This will permit the Forest Entomologist in charge of the project to be present at both training camps.
- VIII. That during the month of February a conference be held for the purpose of discussing the recommendations within this report and problems of the project administered. The supervisors of the Bitterroot, Beaverhead and Deerlodge National Forests

the Forest Officers and Forest Entomologist who are to be in general charge of the project with representatives of the Office of Forest Management and such others as the District Forester may direct, being present at this conference.

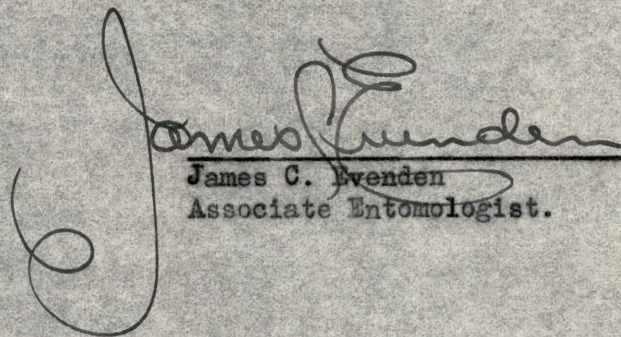
CONCLUSION

There are many details relative to the character of the survey necessary, the manner of marking and mapping the infested trees, keeping of records, etc., which have been omitted from this report. The writer is preparing a paper covering these and other details of administration which is believed should be made available to the forest officers in charge of the project. As stated in the introduction this report has for its purpose the presenting of the data secured from the summer's survey and the making of such recommendations as the writer feels should receive early consideration. In brief this relates to the allotment of funds, the plan of control and the detailing of ten forest officers to assist in this project.

It would seem that this report would hardly be complete without calling attention to the magnitude of the epidemic which we are attacking. Without a rather detailed examination, it is impossible to realize the extent of the infestation which still exists, and will continue for several years more, on the East Fork drainage of the Bitterroot River. Under the holding plan of control, which we are forced to practice due to available funds, this infestation is a source of potential reinfes-

tation within the areas where we are now instituting control work. The infestation within these areas will increase in severity for the next two or three or more years until the source of supply begins to decrease. We must recognize and look forward to the need for a larger expenditure of funds each year until the peak of the reinfestation has passed. It is believed that this will not occur for at least three years. In brief if we expend \$50,000.00 for the treatment of infested trees within the Big Hole Basin and the Bitterroot Forest during the season of 1927, then it is reasonably safe to assume that at least \$100,000.00 will be required to clean the same areas in 1928.

Respectfully submitted,


James C. Evenden
Associate Entomologist.